New England Common Assessment Program

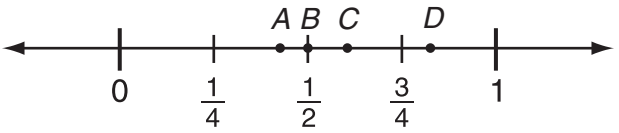
Released Items 2006

Grade 7 Mathematics

Mathematics

Item selected from Session One—no calculators or other mathematics tools allowed.

1 Look at this number line.



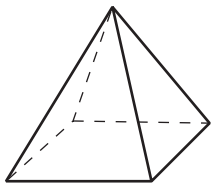
Which point best represents $\frac{6}{10}$?

A. point *A*
B. point *B*
C. point *C*
D. point *D*

2 Which two words describe all equiangular triangles?

A. right, equilateral
B. right, isosceles
C. acute, equilateral
D. acute, scalene

3 The base of this pyramid is a square.



Which statement about the pyramid is true?

A. It has exactly 4 faces.
B. It has exactly 5 edges.
C. It has exactly 6 faces.
D. It has exactly 8 edges.

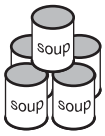
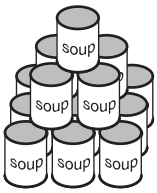
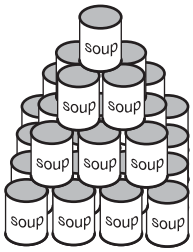
4 Jenn is making lemonade for a picnic.

- Each lemon has about 5 fluid ounces of juice.
- She needs $1\frac{1}{2}$ cups of juice.

How many lemons does Jenn need?
[1 cup = 8 fluid ounces]

A. 2 or 3
B. 4 or 5
C. 6 or 7
D. 8 or 9

5 Look at the diagram below.

Display Number	Display	Number of Soup Cans
1		1
2		5
3		14
4		30

If this pattern continues, how many soup cans will be in Display Number 5?

A. 25
B. 46
C. 55
D. 60

6 Look at this schedule of interview times.

Schedule

Interview	Time
1st	1:00
2nd	1:40
3rd	2:20
4th	3:00

If the pattern continues, at what time is the 5th interview?

A. 3:20
B. 3:40
C. 4:00
D. 4:20

7 The table below shows the heights and weights of four apes in a study.

Ape Study

Height (in inches)	Weight (in pounds)
60	110
66	143
68	154
72	176

Kimo and Miko are two other apes in the study. Kimo is one inch taller than Miko. How much more would Kimo be expected to weigh than Miko?

A. 1.83 pounds
B. 2.44 pounds
C. 2.75 pounds
D. 5.50 pounds

8 Look at this equation.

$$c = r - 0.8r + d$$

What is the value of c when $r = 2000$ and $d = 250$?

A. 200

B. 650

C. 1350

D. 1750

9 Aaron's goal is to read an average (mean) of 26 pages per day for 6 days. During the first 5 days he read 23 pages per day. How many pages must he read on the 6th day to reach his goal?

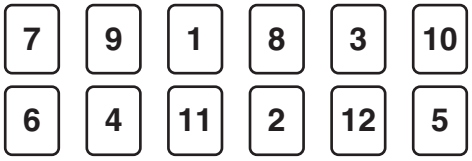
A. 19

B. 26

C. 29

D. 41

10 Look at these tiles.



Haley puts these 12 tiles in a bag and shakes the bag. Then she picks a tile at random. What is the probability she picks a tile that is a multiple of 3?

A. $\frac{8}{4}$

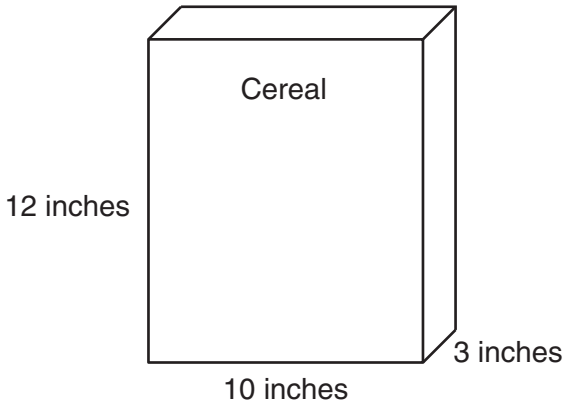
B. $\frac{8}{12}$

C. $\frac{4}{8}$

D. $\frac{4}{12}$

11 Erasers cost \$0.15 each, including tax. What is the greatest number of erasers Diego can buy with \$3.00?

12 A large box of cereal measures 10 inches wide, 12 inches high, and 3 inches deep.



A regular box of cereal has half the volume of the large box of cereal. What could the dimensions of the regular box be?

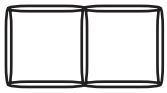
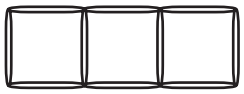
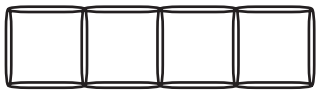
13 Travis has a photograph that is 4 inches wide and 6 inches tall.

a. Travis enlarges the photograph proportionally so that it is 16 inches wide. How tall is it?

b. Can Travis enlarge the photograph proportionally to 8 inches by 10 inches? Explain your answer.

14 Jocelyn used toothpicks to make the first four figures in this pattern.

Jocelyn's Pattern

Figure 1		4 Toothpicks
Figure 2		7 Toothpicks
Figure 3		10 Toothpicks
Figure 4		13 Toothpicks

a. How many toothpicks will Jocelyn need for Figure 5?

b. Write a rule for the number of toothpicks needed for Figure *n*.

15 Look at this diagram.

Ms. Heron's Farmland

Ms. Heron gave her son and grandchildren 12 acres of farmland.

- She gave her son half of the 12 acres.
- She split the rest equally among the 3 grandchildren.

a. How many acres did Ms. Heron give to each grandchild? Show your work or explain how you know.

b. What fraction of the 12 acres did each grandchild receive? Show your work or explain how you know.

Grade 7 Mathematics Released Item Information

Released Item Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No Tools Allowed	✓				✓						✓				✓
Content Strand[1]	NO	GM	GM	GM	FA	FA	FA	FA	DP	DP	NO	GM	GM	FA	NO
GLE Code	6-2	6-1	6-3	6-7	6-1	6-1	6-2	6-3	6-2	6-5	6-4	6-6	6-5	6-1	6-1
Depth of Knowledge Code	2	1	1	2	2	2	2	1	2	2	1	2	3	2	2
Item Type[2]	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	SA	SA	SA	SA	CR
Answer Key	C	C	D	A	C	B	D	B	D	D					
Total Possible Points	1	1	1	1	1	1	1	1	1	1	1	1	2	2	4

[1]Content Strand: NO = Numbers & Operations, GM = Geometry & Measurement, FA = Functions & Algebra, DP = Data, Statistics, & Probability

[2]Item Type: MC = Multiple Choice, SA = Short Answer, CR = Constructed Response

New England Common Assessment Program

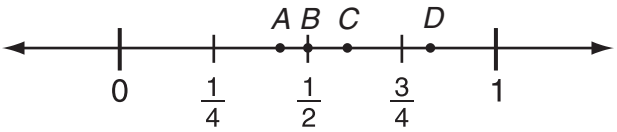
Released Items Support Materials 2006

Grade 7 Mathematics

NECAP 2006 RELEASED ITEMS
GRADE 7 MATHEMATICS

N&O 6.2 **Demonstrates understanding of the relative magnitude of numbers** by ordering or comparing numbers with whole number bases and whole number exponents (e.g.,3^3, 4^3), integers, or rational numbers within and across number formats (fractions, decimals, or whole number percents from 1- 100) using number lines or equality and inequality symbols.

1 Look at this number line.



Which point best represents $\frac{6}{10}$?

A. point *A*
B. point *B*
C. point *C*
D. point *D*

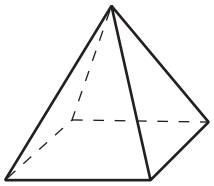
G&M 6.1 **Uses properties or attributes of angles** (right, acute, or obtuse) **or sides** (number of congruent sides, parallelism, or perpendicularity) **to identify, describe, classify, or distinguish** among different types of triangles (right, acute, obtuse, equiangular, scalene, isosceles, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).

2 Which two words describe all equiangular triangles?

A. right, equilateral
B. right, isosceles
C. acute, equilateral
D. acute, scalene

G&M 6.3 **Uses properties or attributes** (shape of bases, number of lateral faces, number of bases, number of edges, or number of vertices) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).

3 The base of this pyramid is a square.



Which statement about the pyramid is true?

A. It has exactly 4 faces.
B. It has exactly 5 edges.
C. It has exactly 6 faces.
D. It has exactly 8 edges.

G&M 6.7 Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems across the content strands.

4 Jenn is making lemonade for a picnic.

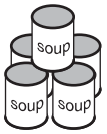
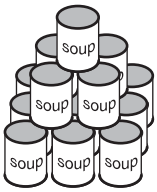
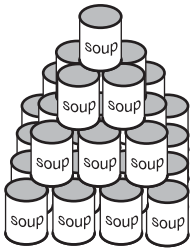
- Each lemon has about 5 fluid ounces of juice.
- She needs $1\frac{1}{2}$ cups of juice.

How many lemons does Jenn need?
[1 cup = 8 fluid ounces]

A. 2 or 3
B. 4 or 5
C. 6 or 7
D. 8 or 9

F&A 6.1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; or writes a rule in words or symbols for finding specific cases of a linear relationship; or writes a rule in words or[sc] symbols for finding specific cases of a nonlinear relationship; and writes an expression or[sc] equation using words or[sc] symbols to express the **generalization** of a linear relationship (e.g., twice the term number plus 1 or[sc] 2n + 1).

5 Look at the diagram below.

Display Number	Display	Number of Soup Cans
1		1
2		5
3		14
4		30

If this pattern continues, how many soup cans will be in Display Number 5?

A. 25
B. 46
C. 55
D. 60

F&A 6.1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; or writes a rule in words or symbols for finding specific cases of a linear relationship; or writes a rule in words or[sc] symbols for finding specific cases of a nonlinear relationship; and writes an expression or[sc] equation using words or[sc] symbols to express the **generalization** of a linear relationship (e.g., twice the term number plus 1 or[sc] 2n + 1).

6 Look at this schedule of interview times.

Schedule

Interview	Time
1st	1:00
2nd	1:40
3rd	2:20
4th	3:00

If the pattern continues, at what time is the 5th interview?

A. 3:20
B. 3:40
C. 4:00
D. 4:20

F&A 6.2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$; $y = mx + b$) **as a constant rate of change** by constructing or interpreting graphs of real occurrences and describing the slope of linear relationships (faster, slower, greater, or smaller) in a variety of problem situations; **and describes how change in the value of one variable relates to change in the value of a second variable** in problem situations with constant rates of change.

7 The table below shows the heights and weights of four apes in a study.

Ape Study

Height (in inches)	Weight (in pounds)
60	110
66	143
68	154
72	176

Kimo and Miko are two other apes in the study. Kimo is one inch taller than Miko. How much more would Kimo be expected to weigh than Miko?

A. 1.83 pounds

B. 2.44 pounds

C. 2.75 pounds

D. 5.50 pounds

F&A 6.3 **Demonstrates conceptual understanding of algebraic expressions** by using letters to represent unknown quantities to write linear algebraic expressions involving two or more of the four operations; or by evaluating linear algebraic expressions (including those with more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 3x - 2$).

8 Look at this equation.

$$c = r - 0.8r + d$$

What is the value of c when $r = 2000$ and $d = 250$?

A. 200
B. 650
C. 1350
D. 1750

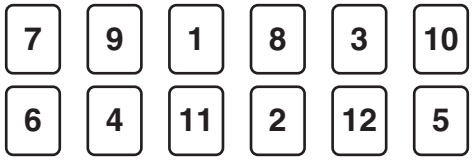
DSP 6.2 **Analyzes patterns, trends or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode) or dispersion (range) to analyze situations, or to solve problems.

9 Aaron's goal is to read an average (mean) of 26 pages per day for 6 days. During the first 5 days he read 23 pages per day. How many pages must he read on the 6th day to reach his goal?

A. 19
B. 26
C. 29
D. 41

DSP 6.5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event in a problem-solving situation.

10 Look at these tiles.



Haley puts these 12 tiles in a bag and shakes the bag. Then she picks a tile at random. What is the probability she picks a tile that is a multiple of 3?

A. $\frac{8}{4}$

B. $\frac{8}{12}$

C. $\frac{4}{8}$

D. $\frac{4}{12}$

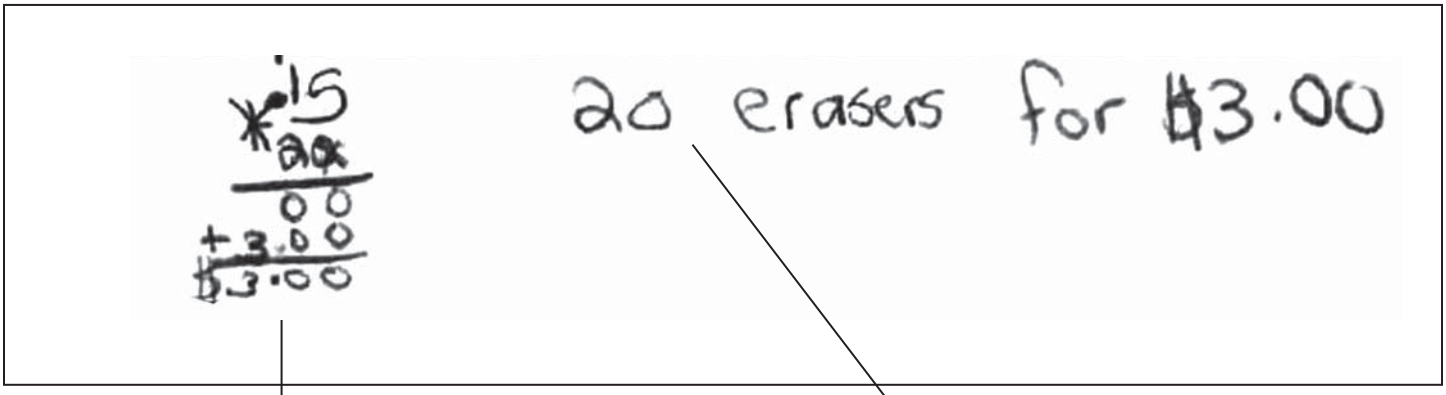
N&O 6.4 **Accurately solves problems involving** single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple. (IMPORTANT*: Applies the conventions of order of operations with and without parentheses.*)

11 Erasers cost $0.15 each, including tax. What is the greatest number of erasers Diego can buy with $3.00?

Scoring Guide

Score	Description
1	Student gives the correct answer, **20 (erasers)**.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

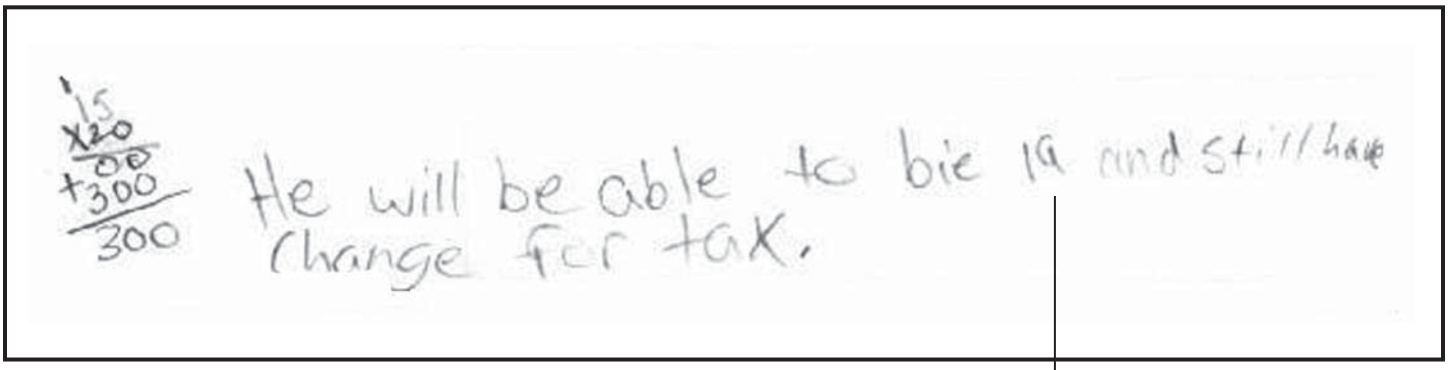
SCORE POINT 1
(EXAMPLE A)



Although included and correct, work is not necessary for credit.

Student correctly gives the greatest number of erasers Diego can buy.

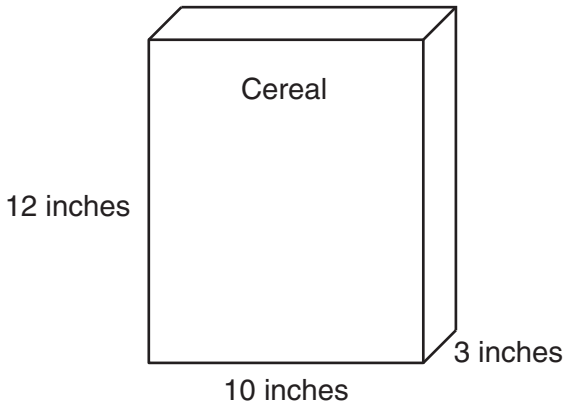
SCORE POINT 0
(EXAMPLE A)



Student's answer is incorrect (tax is included in the $0.15 cost).

G&M 6.6 **Demonstrates conceptual understanding of perimeter** of polygons, **the area of** quadrilaterals or triangles, and **the volume of** rectangular prisms by using models, formulas, or by solving problems; and **demonstrates understanding of the relationships of circle measures** (radius to diameter and diameter to circumference) by solving related problems. Expresses all measures using appropriate units.

12 A large box of cereal measures 10 inches wide, 12 inches high, and 3 inches deep.



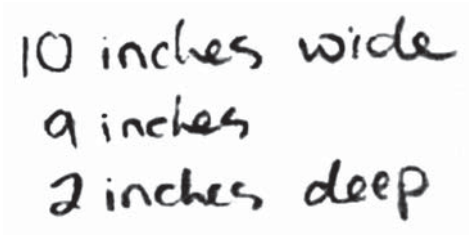
A regular box of cereal has half the volume of the large box of cereal. What could the dimensions of the regular box be?

Scoring Guide

Score	Description
1	Student gives a correct answer, **any three measures with a product of 180 cubic inches**.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

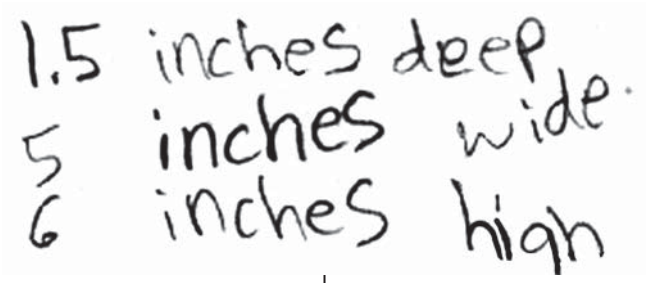
Note: Do not penalize if units are omitted.

SCORE POINT 1
(EXAMPLE A)



Student has a correct answer (three measures that have a product of 180 cubic inches).

SCORE POINT 0
(EXAMPLE A)



Student's answer is incorrect (the three measures do not have a product of 180 cubic inches).

G&M 6.5 **Demonstrates conceptual understanding of similarity** by describing the proportional effect on the linear dimensions of polygons or circles when scaling up or down while preserving the angles of polygons, or by solving related problems (including applying scales on maps). Describes effects using models or[sc] explanations.

13 Travis has a photograph that is 4 inches wide and 6 inches tall.

a. Travis enlarges the photograph proportionally so that it is 16 inches wide. How tall is it?

b. Can Travis enlarge the photograph proportionally to 8 inches by 10 inches? Explain your answer.

Scoring Guide

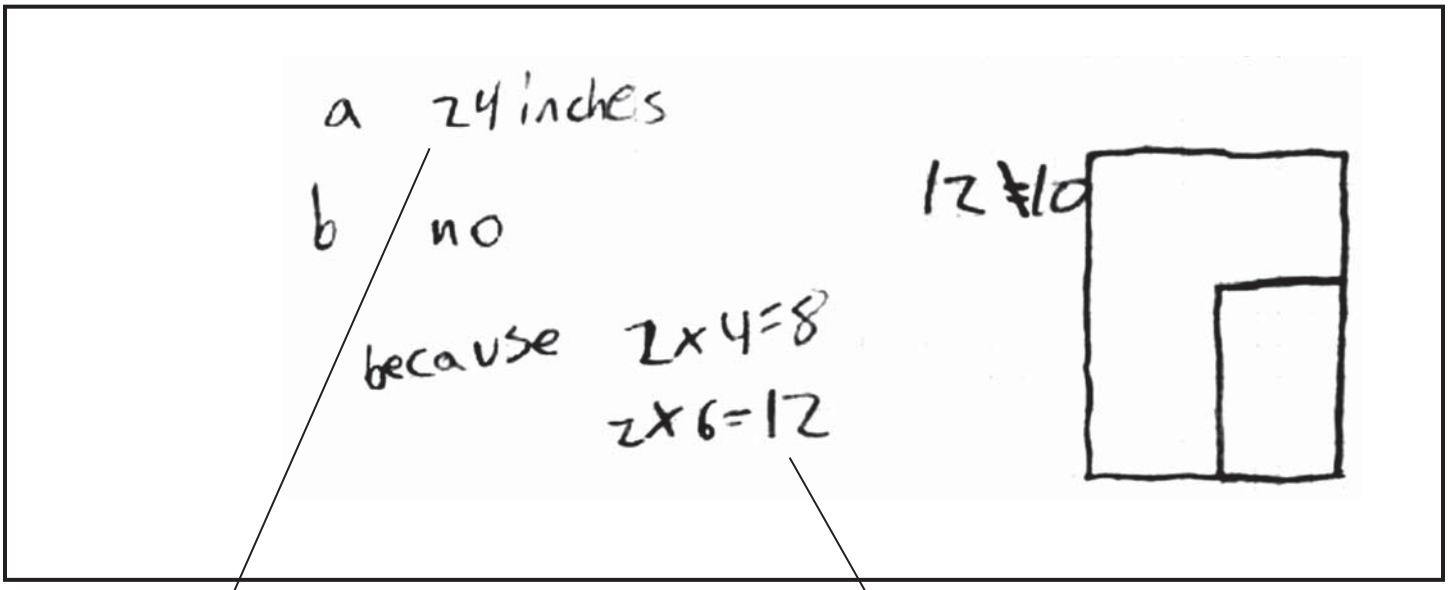
Score	Description
2	Student gives the correct answer to part a, **24 (inches)**, and a correct explanation for part b.
1	Student gives the correct answer to part a or a correct explanation for part b.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Sample Response:

Part b: No. If a 4-by-6 went to an 8-by-10 size, the shapes would not be the same because the figures or objects in the enlargement would not be similar to the ones in the original.

Original: ratio of sides is $\frac{4}{6}=\frac{2}{3}$. Enlargement: ratio of sides is $\frac{8}{10}=\frac{4}{5}$. If objects would be similar, the ratios of the sides would have to be the same, but they're not.

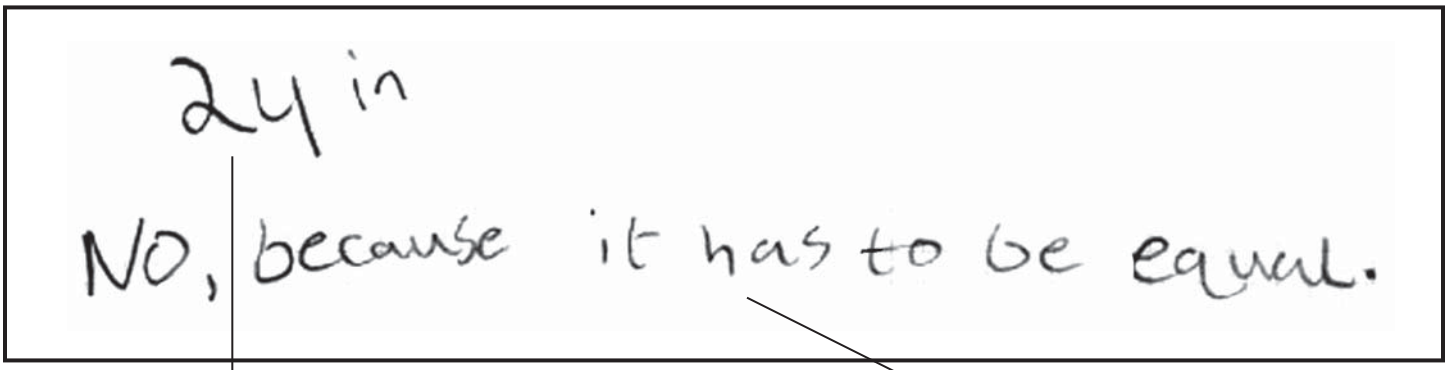
SCORE POINT 2
(EXAMPLE A)



a) Student's answer is correct. (1 point)

b) Student has a correct explanation. (1 point)

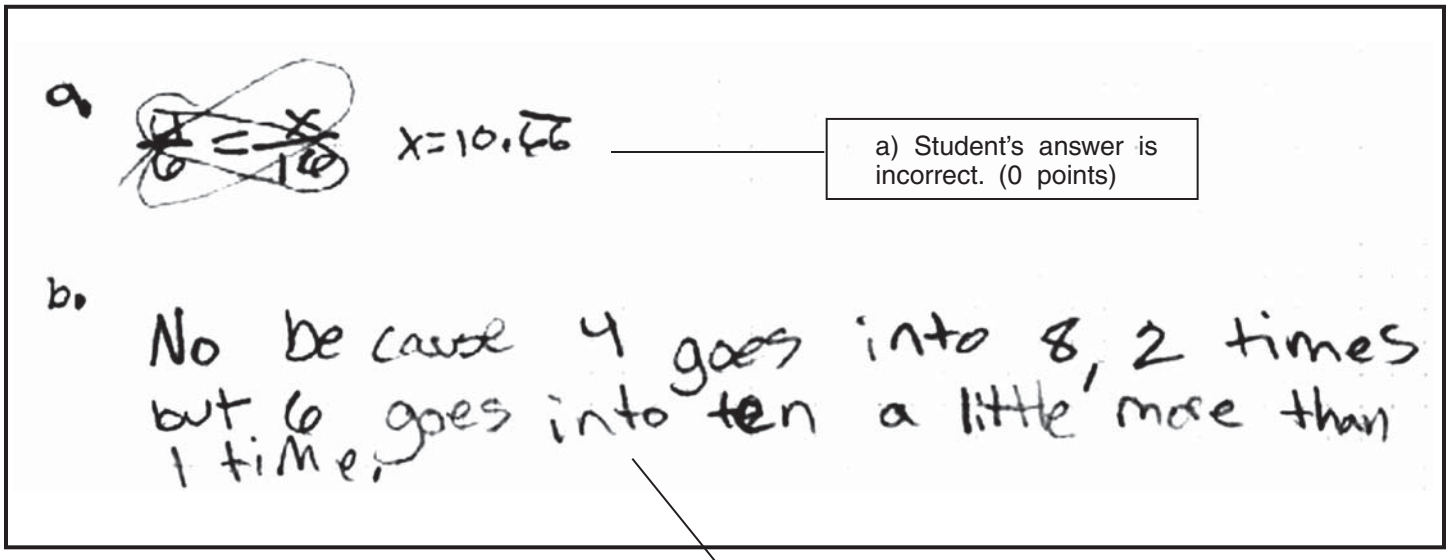
SCORE POINT 1
(EXAMPLE A)



a) Student's answer is correct. (1 point)

b) Student's explanation is vague. (0 points)

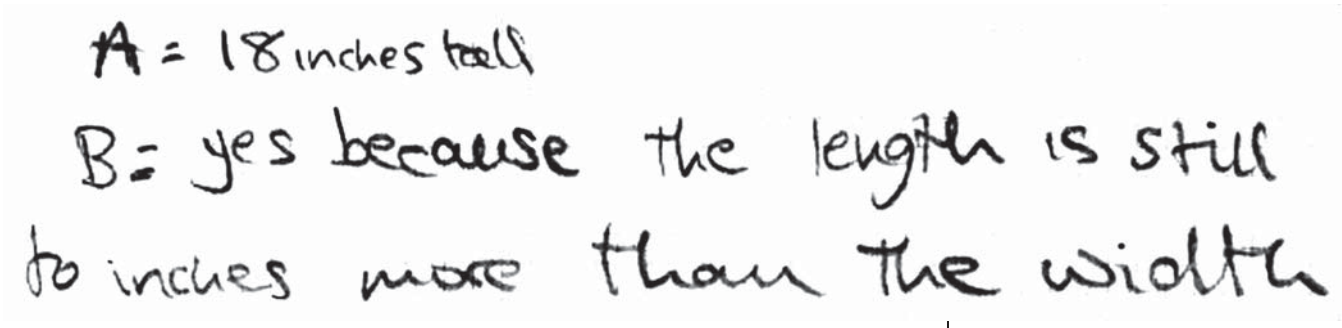
SCORE POINT 1
(EXAMPLE B)



a) Student's answer is incorrect. (0 points)

b) Student's explanation is sufficient. (1 point)

SCORE POINT 0
(EXAMPLE A)

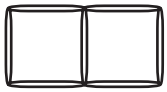
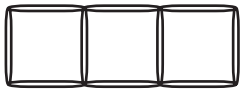
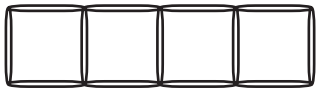


Student's answer and explanation are incorrect (uses additive rather than multiplicative reasoning). (0 points)

F&A 6.1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; or writes a rule in words or symbols for finding specific cases of a linear relationship; or writes a rule in words or[sc] symbols for finding specific cases of a nonlinear relationship; and writes an expression or[sc] equation using words or[sc] symbols to express the **generalization** of a linear relationship (e.g., twice the term number plus 1 or[sc] 2n + 1).

14 Jocelyn used toothpicks to make the first four figures in this pattern.

Jocelyn's Pattern

Figure 1		4 Toothpicks
Figure 2		7 Toothpicks
Figure 3		10 Toothpicks
Figure 4		13 Toothpicks

a. How many toothpicks will Jocelyn need for Figure 5?

b. Write a rule for the number of toothpicks needed for Figure *n*.

Scoring Guide

Score	Description
2	Student gives the correct number of toothpicks, **16 (toothpicks)**, for Figure 5 in part a, and a correct general rule in part b.
1	Student gives the correct number of toothpicks in part a or a correct general rule in part b.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

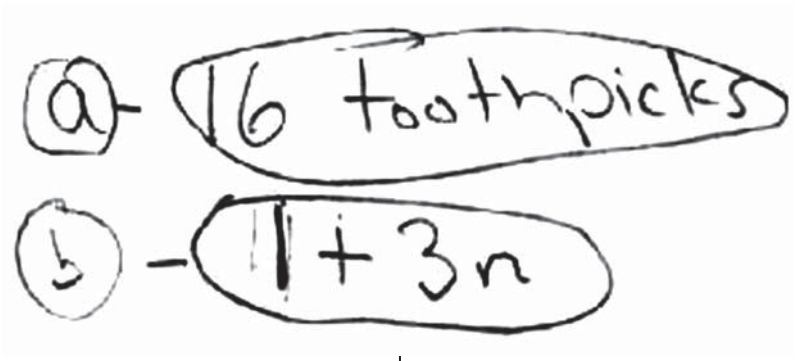
Sample Response:

Part b: $3n + 1$ (or equivalent)

OR

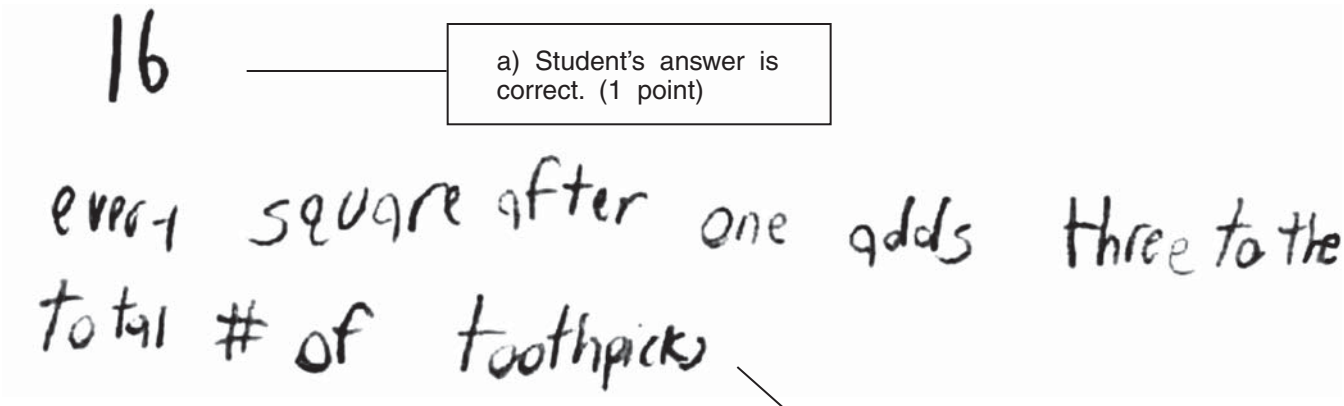
3 times the figure number plus one (or equivalent)

SCORE POINT 2
(EXAMPLE A)



Student's answer and rule are correct. (2 points)

SCORE POINT 1
(EXAMPLE A)



a) Student's answer is correct. (1 point)

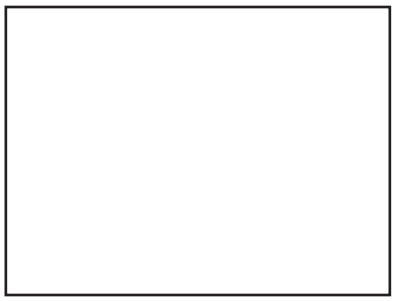
b) Student demonstrates an understanding of recursive reasoning but does not fully describe a method to calculate the number of toothpicks needed for Figure *n* (e.g., add three *n* – 1 times to four). (0 points)

SCORE POINT 0
(EXAMPLE A)

Student's answer and rule are incorrect. (0 points)

N&O 6.1 **Demonstrates conceptual understanding of rational numbers with respect to** ratios (comparison of two whole numbers by division a/b, $a : b$, and $a \div b$, where $b \neq 0$); and rates (e.g., a out of b, 25%) **using models, explanations, or other representations**.

15 Look at this diagram.



Ms. Heron's Farmland

Ms. Heron gave her son and grandchildren 12 acres of farmland.

- She gave her son half of the 12 acres.
- She split the rest equally among the 3 grandchildren.

a. How many acres did Ms. Heron give to each grandchild? Show your work or explain how you know.

b. What fraction of the 12 acres did each grandchild receive? Show your work or explain how you know.

Scoring Guide

Score	Description
4	4 points
3	3 points
2	2 points
1	1 point OR Student shows minimal understanding of solving problems involving rational numbers.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Part a: 2 points for correct answer, **2 (acres)**, with explanation

OR

1 point for correct answer with incorrect explanation or explanation indicating correct strategy without arriving at actual correct answer

Part b: 2 points for correct answer, $\mathbf{\frac{1}{6}}$ (or equivalent), with explanation

OR

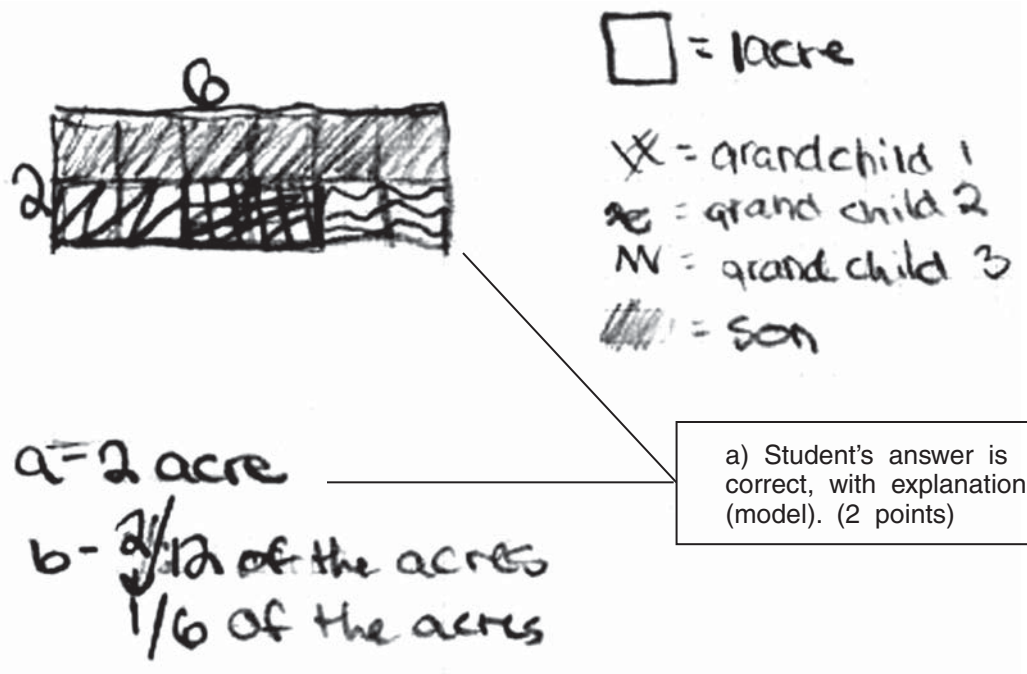
1 point for correct answer with incorrect explanation or correct explanation without correct answer

Sample Responses:

Part a: 2 acres. $\frac{1}{2}$ of 12 is 6, diagram divided into 6 equal parts with 2 acres shown in at least one, or other explanation.

Part b: $\frac{1}{6}$, $\frac{2}{12}$, or equivalent. Each grandchild got 2 acres out of a total of 12 acres, so that is $\frac{2}{12}$ or $\frac{1}{6}$.

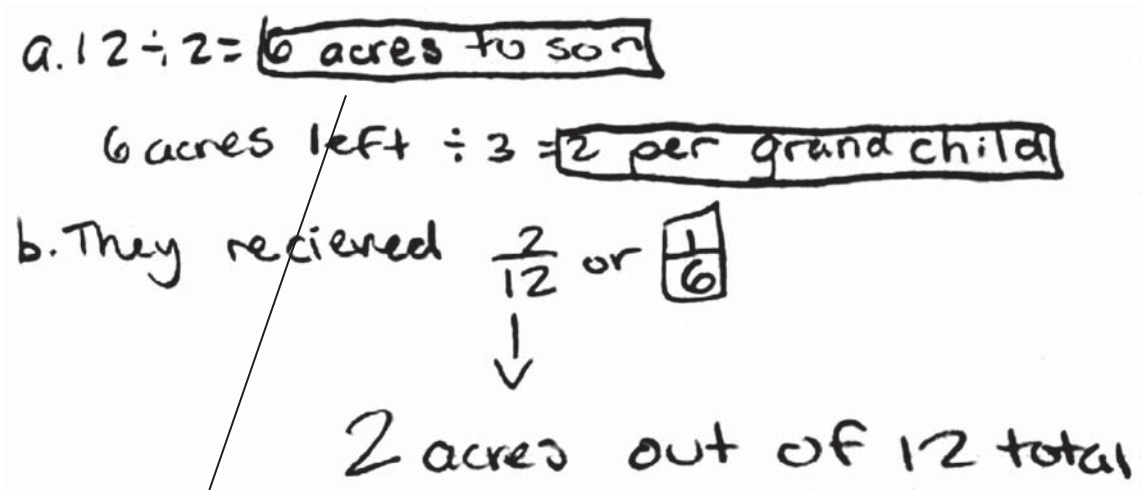
SCORE POINT 4
(EXAMPLE A)



a) Student's answer is correct, with explanation (model). (2 points)

b) Student's answer is correct, with work shown. (2 points)

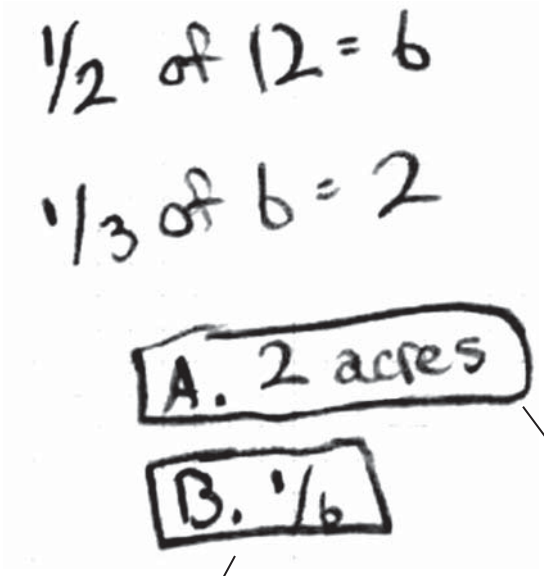
SCORE POINT 4
(EXAMPLE B)



a) Student's answer is correct, with work shown. (2 points)

b) Student's answer is correct, with explanation. (2 points)

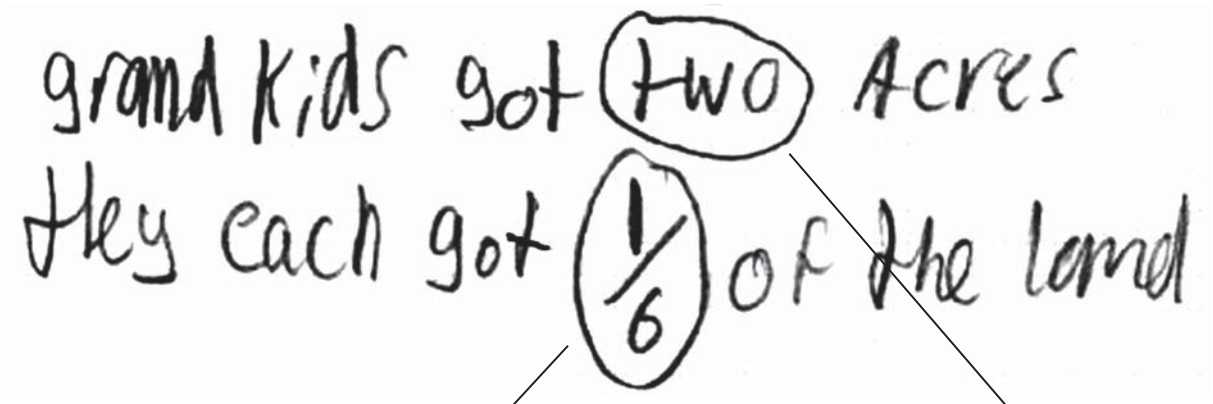
SCORE POINT 3
(EXAMPLE A)



b) Student's answer is correct, with no work shown or explanation given. (1 point)

a) Student's answer is correct, with work shown. (2 points)

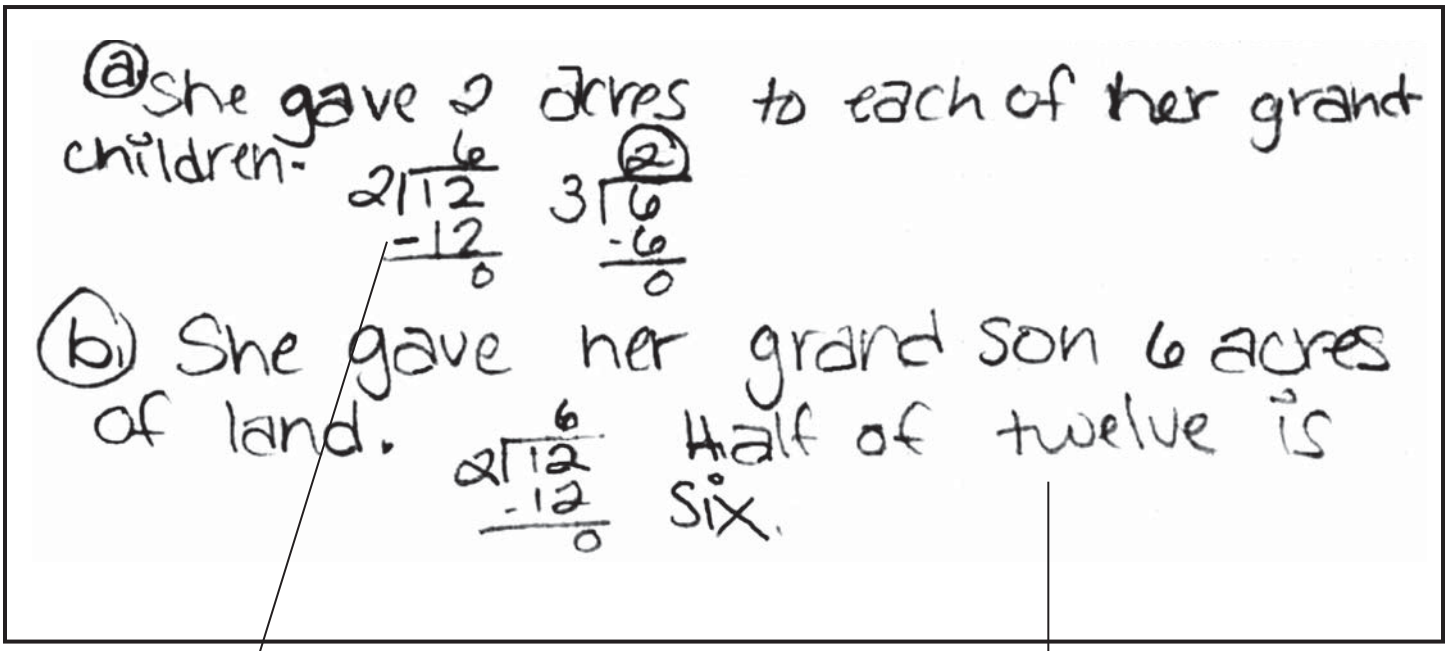
SCORE POINT 2
(EXAMPLE A)



b) Student's answer is correct, with no work shown or explanation given. (1 point)

a) Student's answer is correct, with no work shown or explanation given. (1 point)

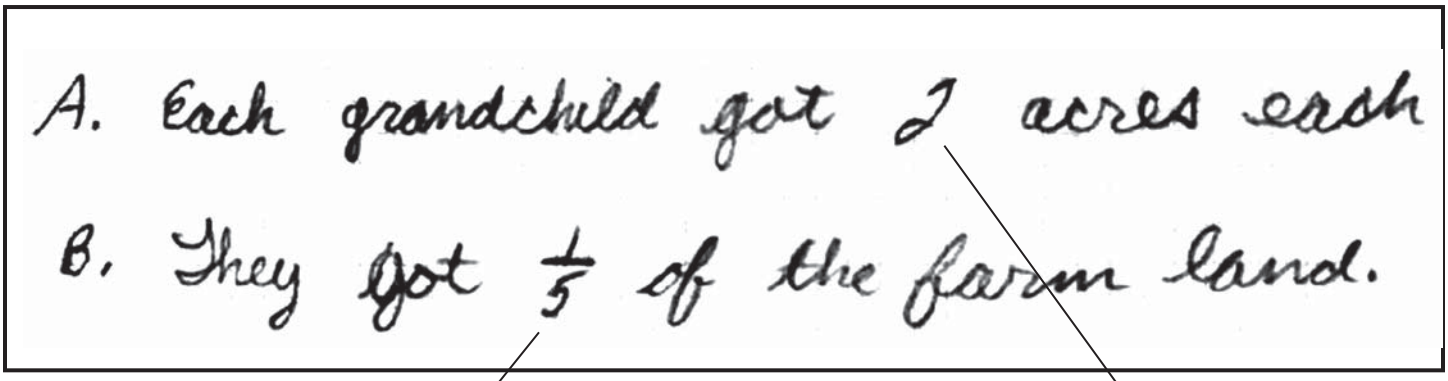
SCORE POINT 2
(EXAMPLE B)



a) Student's answer is correct, with work shown. (2 points)

b) Student's answer and work are incorrect (do not indicate what fraction each grandchild received). (0 points)

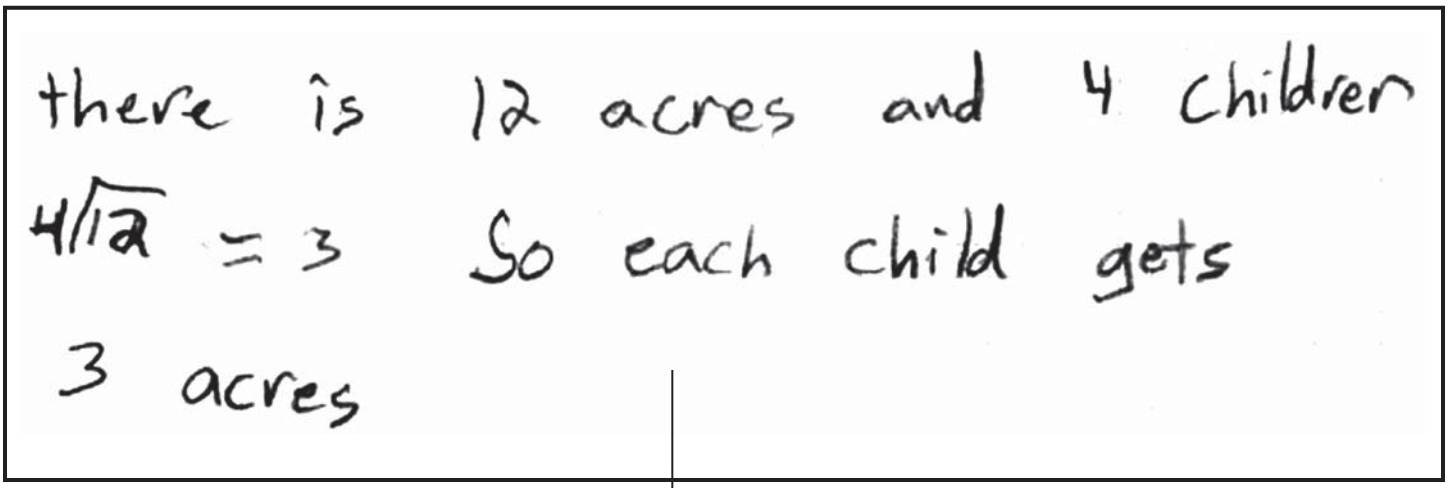
Score Point 1
(Example A)



b) Student's answer is incorrect, with no work shown or explanation given. (0 points)

a) Student's answer is correct, with no work shown or explanation given. (1 point)

Score Point 0
(Example A)



Student's response is incorrect for both parts a and b. (0 points)